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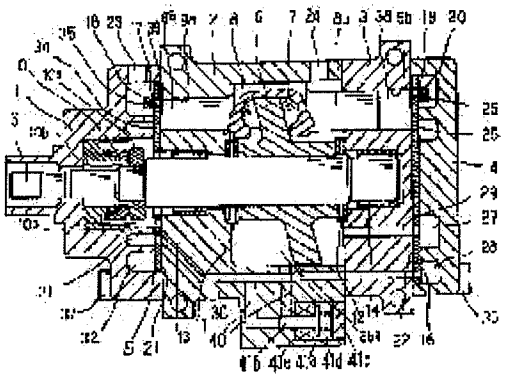
(54) SWASH PLATE TYPE COMPRESSOR

(57)Abstract:

PROBLEM TO BE SOLVED: To realize a variable capacity function at a low cost in a two-stage swash plate compressor.

SOLUTION: The diameter size of a first piston part 8b is made larger than the diameter size of a second piston part 8a, thereby opening and closing a by-path passage 40 for communicating a swash plate chamber 38a with a communicating passage 30. Thus, the capacity of a swash plate type compressor in the case of closing the by-pass passage 40 is determined by the volume of a first operating chamber 38, and the capacity of the swash plate compressor in the case of opening the by-pass passage 40 is determined by the volume of a second operating chamber 39. Accordingly, a variable capacity mechanism can be realized by opening and closing of the by-pass passage 40.



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CLAIMS

[Claim(s)]
[Claim 1] The revolving shaft (5) which obtains driving force and rotates, and housing which carries out the maintenance receipt of said revolving shaft (5) pivotable (1, 2, 3, 4), Two or more cylinders formed in said housing (2 3) at said revolving shaft (5) and parallel (9a, 9b), The dual leadership piston which has the 1st and 2 piston section (8b, 8a) from which it reciprocates within said cylinder (9a, 9b), and a diameter size method differs on shaft-orientations order both sides (8), The cam plate which it is prepared [cam plate] in said revolving shaft (5), and rotation of said revolving shaft (5) is changed [cam plate] into a reciprocating motion, and makes said dual leadership piston (8) reciprocate (6), Two or more 1st actuation rooms formed of said cylinder (9a, 9b) and said 1st piston section (8b) (38), Two or more 2nd actuation rooms formed of said cylinder (9a, 9b) and said 2nd piston section (8a) (39), The inhalation way which is formed in said housing (1, 2, 3, 4), and leads a fluid to said two or more 1st actuation rooms (38) (24, 38a, 27, 29), The repressing free passage way which the fluid breathed out from said two or more 1st actuation rooms (38) is gathered, and leads it to said two or more 2nd actuation rooms (39) (28, 30, 31), The bypass way which makes said inhalation way (24, 38a, 27, 29) and said repressing free passage way (28, 30, 31) open for free passage (40), It is the cam-plate mold compressor characterized by being characterized by having the closing motion valve (41) which opens and closes said bypass way (40), and the diameter size method of said 1st piston section (8b) being larger than the diameter size method of said 2nd piston section (8a).
[Claim 2] Said bypass way (40) is a cam-plate mold compressor according to claim 1 characterized by being formed in said housing (1, 2, 3, 4).

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention uses for a refrigerating cycle about a two-stage compression-type variable-capacity cam-plate mold compressor and is suitable.
[0002]
[Description of the Prior Art] A two-stage compression-type cam-plate mold compressor changes rotation of a revolving shaft into a reciprocating motion as everyone knows through the cam plate aslant arranged to a revolving shaft, and carries out movable [of the dual leadership piston]. A fluid is compressed at the 1st actuation room formed in the end side of this dual leadership piston, and after that, the fluid compressed at the 1st actuation room is led to the 2nd actuation room formed in the other end side, and is compressed again.
[0003] Moreover, as a variable-capacity-type cam-plate mold compressor, by JP,55-160187,A, the fluid breathed out from two or more actuation rooms is gathered in two or more regurgitation rooms, and what makes discharging volume adjustable is devised by controlling the closing motion valve which opens the breathed-out fluid to an inhalatorium.
[0004]
[Problem(s) to be Solved by the Invention] However, since a design given in the above-mentioned official report must form two or more regurgitation rooms, the configuration of front housing with which a regurgitation room is formed, and rear housing ** will become complicated, and it will cause enlargement and manufacturing cost lifting of both housing, as a result will cause manufacturing cost lifting of a cam-plate mold compressor.
[0005] This invention aims at realizing a variable-capacity function cheaply in a two-stage compression-type cam-plate mold compressor in view of the point describing above.
[0006]
[Means for Solving the Problem] In order to attain the above-mentioned object, the following technical means are used for this invention. The inhalation way which the diameter size methods of the 1st and 2 piston section (8b, 8a) of a dual leadership piston (8) differ mutually, and leads a fluid to two or more 1st actuation rooms (38) further in invention according to claim 1 to 3 (24, 38a, 27, 29), It is characterized by arranging a closing motion valve (41) in the bypass way (40) which makes the repressing free passage way (28, 30, 31) which the fluid breathed out from two or more 1st actuation rooms (38) is gathered, and leads it to two or more 2nd actuation rooms (39) open for free passage.
[0007] if this closes a closing motion valve (41) so that it may mention later, the fluid compressed at the 1st actuation room (38) should pass a repressing free passage way (28, 30, 31) -- it is inhaled and repressed by the 2nd actuation room (39). That is, the discharging volume in the condition of having closed the closing motion valve (41) is determined by the volume of the 1st actuation room (38). On the other hand, if a closing motion valve (41) is opened, since the pressure of the fluid compressed at the 1st actuation room (38) will become equal to the pressure in an inhalation way (24, 38a, 27, 29), i.e., suction pressure, the work of compression in the 1st actuation room (38) turns into lost work. and a fluid should

pass an inhalation way (24, 38a, 27, 29) and a repressing free passage way (28, 30, 31) -- since it is inhaled and compressed by the 2nd actuation room (39), the discharging volume in the condition of having opened the closing motion valve (41) is determined by the volume of the 2nd actuation room (39).

[0008] Moreover, since the diameter size methods of the 1st and 2 piston section (8b, 8a) differ mutually, the volume of a 1st and 2 actuation room (38 39) also differs mutually. That is, the capacity of a cam-plate mold compressor changes with closing motion actuation of a closing motion valve (41). As stated above, the diameter size method of the 1st and 2 piston section (8b, 8a) is changed mutually. With and a simple means to open and close the bypass way (40) which makes an inhalation way (24, 38a, 27, 29) and a repressing free passage way (28, 30, 31) open for free passage Since the variable-capacity device of a cam-plate mold compressor is realizable, manufacturing cost lifting of a cam-plate mold compressor can be controlled.

[0009] In invention according to claim 2, the diameter size method of the 1st piston section (8b) is characterized by being smaller than the diameter size method of the 2nd piston section (8a). In invention according to claim 3, a bypass way (40) is characterized by being formed in housing (1, 2, 3, 4). In addition, the sign in the parenthesis of each above-mentioned means shows response relation with the concrete means given in an operation gestalt mentioned later.

[0010]

[Embodiment of the Invention] Hereafter, the gestalt of the operation which shows this invention in drawing is explained.

(The 1st operation gestalt) The cam-plate mold compressor concerning this operation gestalt is a thing at the time of using for the refrigerating cycle which uses a refrigerant with the high working pressure of a carbon dioxide (CO2) etc., and drawing 1 shows the shaft-orientations cross section of the cam-plate mold compressor (it is only hereafter called a compressor.) concerning this invention.

[0011] 5 is the revolving shaft which obtains the driving force from external driving sources (engine for car transit etc.), and rotates through the electromagnetic clutch which is not illustrated, and this revolving shaft 5 is held pivotable by the radial bearing 13 and 14 and thrust bearing 11 and 12 which have been arranged at cylinder blocks (housing) 2 and 3. Here, radial bearing 13 and 14 opposed the load of the perpendicular direction of a revolving shaft 5, and thrust bearing 11 and 12 has opposed the axial load of a revolving shaft 5.

[0012] In a cylinder block 2 and 3, centering on a revolving shaft 5, parallel, and a revolving shaft 5, Cylinders 9a and 9b are formed in the location equally divided into three in the hoop direction, and cylinder 9b is formed for cylinder 9a with a total of six three at the cylinder block 2 side at the three and cylinder block 3 side. Moreover, two or more 1st actuation rooms 38 and 2nd actuation rooms 39 are formed in both the cylinders 9a and 9b for the dual leadership piston 8 which has the 1st and 2 piston sections 8b and 8a from which a diameter size method differs on shaft-orientations order both sides, respectively of an insertion **** cage, this dual leadership piston 8, and both the cylinders 9b and 9a. In addition, with this operation gestalt, since the diameter size method of 1st piston section 8b is larger than the diameter size method of 2nd piston section 8a, the volume of the 1st actuation room 38 becomes larger than the volume of the 2nd actuation room 39.

[0013] The dual leadership piston 8 is driven with the specified quantity ****** cam plate 6 to the revolving shaft combined with the revolving shaft 5, and this cam plate 6 changes rotation of a revolving shaft 5 into a reciprocating motion, and it makes the dual leadership piston 8 reciprocate in both cylinder 9a and 9b. In addition, between the cam plate 6 and the dual leadership piston 8, the shoe 7 of a couple is arranged so that both may exercise smoothly, and three dual leadership pistons 8 are arranged at the circumference of a revolving shaft 5, as shown in drawing 2 and 3.

[0014] The inhalation opening 24 which inhales the refrigerant which flowed into the cylinder block 2 the evaporator of the refrigerating cycle which is not illustrated is formed, and this inhalation opening 24 is open for free passage to cam-plate room 38a which both the cylinder blocks 2 and the cam plate 6 formed in three rotate. Moreover, the valve plates 15 and 16 which blockade both the actuation room 38, the suction valve portions 21 and 22 which prevent the back run of the refrigerant inhaled in 39, and

both the cylinders 9a and 9b are arranged at the end face of both the cylinder blocks 2 and 3. It is fixed to the valve plate 15 with the bolt with which the valve basalia 18 to which the inhalation opening 34 which is open for free passage to cylinder 9a, and a delivery 35 regulate the maximum opening of the discharge valve 17 which prevents the back run of the refrigerant breathed out from the actuation room 39 in the delivery 35 of the opposite hand of formation **** cage and cylinder 9a, and this discharge valve 17 to a valve plate 15 is not illustrated. Similarly the inhalation opening 25 and the delivery 26 which are open for free passage to cylinder 9b are formed in the valve plate 16, and it is fixed to the valve plate 16 with the bolt with which a discharge valve 19 and the valve basalia 20 are not illustrated in the delivery 26 of the opposite hand of cylinder 9b.

[0015] In addition, a valve plate 15 and a discharge valve 17 are pinched by the front housing 1 and the cylinder block 2, and are ******(ed) by the bolt 37. Similarly, a valve plate 16 and a discharge valve 19 are pinched by the rear housing 4 and the cylinder block 3, and are ******(ed) by the bolt 36. In the front housing 1, the shaft sealing 10 which prevents that a refrigerant leaks from the clearance between the front housing 1 and a revolving shaft 5 to the exterior has been arranged, and this shaft sealing 10 has prevented the leakage of a refrigerant in contact with end-face 10b of ring 10a pressed fit in the revolving shaft 5. And the inhalation opening 34, the front intermediate pressure room 31 open for free passage and the delivery 35, and the regurgitation room 32 open for free passage are formed in the front housing 1.

[0016] In addition, as the front intermediate pressure room 31 is shown in drawing 2 , the refrigerant is distributed to three inhalation openings 34 formed in the front housing 1, and the regurgitation room 32 gathers the refrigerant breathed out from three deliveries 35 formed in the front housing 1, and carries out the regurgitation of the refrigerant to the condenser of the refrigerating cycle which is not illustrated from the delivery 23 formed in the front housing 1.

[0017] Moreover, as shown in the rear housing 4 at drawing 1 , the inhalation opening 25, the inhalatorium 27 open for free passage and the delivery 26, and the rear intermediate pressure room 28 open for free passage are formed, and the inhalatorium 27 is open for free passage with cam-plate room 38a with the free passage way 29. Furthermore, the rear intermediate pressure room 28 is open for free passage with the front intermediate pressure room 31 of the front housing 1 with the free passage way 30 formed in cylinder blocks 2 and 3.

[0018] In addition, the inhalatorium 27 has distributed the refrigerant to three inhalation openings 25 formed in the rear housing 4, and the rear intermediate pressure room 28 gathers the refrigerant breathed out from three deliveries 26 formed in the rear housing 4, and it is making the free passage way 30 open it for free passage, as shown in drawing 3 . Moreover, 40 is a bypass way (formed in the broken-line section and space back side.) which makes cam-plate room 38a and the free passage way 30 open for free passage, and 41 is the non-energizing **** type solenoid valve (closing motion valve) 41 which opens and closes the bypass way 40. This solenoid valve 41 consists of stopper section (fixed iron core) 41c which opposes plunger 41b which serves both as yoke housing section 41a which makes the magnetic path of the solenoid valve 41 united with the cylinder block 2, and the valve element which opens and closes the bypass way 40 and a moving core (plunger), and plunger 41b, coil-spring 41d for the returns of plunger 41b, and exiting coil 41e.

[0019] And as shown in drawing 4 , it is controlled by the control unit 42 and the signal from the coolant temperature sensor which detects the circulating water temperature which flows into the heater core for heating which is not illustrated, and the air conditioning sensor S which detects information required to control air conditioners, such as a sensor, whenever [vehicle outdoor temperature sensor or vehicle room air temperature] is inputted into this control unit 42, and the solenoid valve 41 is controlling said electromagnetic-clutch EC and solenoid valve 41 based on these signals.

[0020] In addition, after extent time amount passed the solenoid valve 41 several seconds (about 2 - 3 seconds) an aperture and after that in connection of an electromagnetic clutch and coincidence, it controlled by this operation gestalt to close a solenoid valve 41, and the displeasure of the crew at the time of electromagnetic-clutch connection is controlled. Next, actuation of the compressor concerning this operation gestalt is described.

1. Maximum Discharging Volume Operation (Condition Which Closed Solenoid Valve 41)
The low-pressure refrigerant (this operation gestalt about 35 kgf/cm2) inhaled from the inhalation opening 24 is breathed out by the rear intermediate pressure room 28, after being inhaled at the 1st actuation room 38 through cam-plate room 38a, the free passage way 29, an inhalatorium 27, and the inhalation way that results in the inhalation opening 25 and compressing even intermediate pressure (this operation gestalt about 60 kgf/cm2). Furthermore, a refrigerant is inhaled at the 2nd actuation room 39 through the free passage way 30, the front intermediate pressure room 31, and the repressing free passage way that results in the inhalation opening 34. Then, a refrigerant is compressed to a discharge pressure (this operation gestalt about 110 kgf/cm2) at the 2nd actuation room 39, and carries out the regurgitation to the compressor exterior from a delivery 23 through the regurgitation room 32. Therefore, two steps of refrigerants are compressed at the 1st actuation room 38 and the 2nd actuation room 39 (refer to drawing 1).

[0021] 2. Variable-Capacity Operation (Condition Which Opened Solenoid Valve 41)
It is inhaled at the 1st actuation room 38 through cam-plate room 38a, the free passage way 29, an inhalatorium 27, and the inhalation opening 25, even intermediate pressure is compressed, and the low-pressure refrigerant inhaled from the inhalation opening 24 is breathed out by the rear intermediate pressure room 28. However, since the bypass way 40 is open, rear intermediate pressure room 28 internal pressure becomes equal to cam-plate room 38a internal pressure (inlet pressure).

[0022] Thereby, since the work of compression in the 1st actuation room 38 turns into lost work, after being inhaled at the 2nd actuation room 39 through cam-plate room 38a, the free passage way 30, the front intermediate pressure room 31, and the inhalation opening 34, the refrigerant inhaled from the inhalation opening 24 is compressed at the 2nd actuation room 39, and is breathed out by the compressor exterior from a delivery 23 through the regurgitation room 32. And since the volume of the 2nd actuation room 39 is smaller than the volume of the 1st actuation room 38, the amount of refrigerants breathed out from a delivery 23 (inhaled by 2nd actuation room 39), i.e., a mass flow rate, decreases (refer to drawing 5).

[0023] Next, the description of this operation gestalt is described. According to this operation gestalt, the bypass way 40 which makes cam-plate room 38a and the free passage way 30 open for free passage is formed, and with a simple means to open and close this bypass way 40, since a good capacity device is realizable, manufacturing cost lifting of the two-stage compression-type cam-plate mold compressor which has a variable-capacity function can be controlled.

[0024] (The 2nd operation gestalt) This operation gestalt did not open and close the bypass way 40 directly with a solenoid valve 41, but as shown in drawing 6 , it carried out closing motion actuation of the valve element 42 which opens and closes the bypass way 40 directly indirectly with the solenoid valve 41 (it considered as the pilot type). That is, a valve element 42 forms the free passage way 44 which makes the rear intermediate pressure room 28 open for free passage the end side of the cylinder 43 contained possible [a reciprocating motion], and the free passage way 45 which makes the regurgitation room 32 open an other end side for free passage, and arranges a solenoid valve 41 in the free passage way 45. In addition, 46 is a coil spring for the returns of a valve element 42.

[0025] Next, actuation of this operation gestalt is described. Unlike the 1st operation gestalt, a solenoid valve 41 is opened at the time of the maximum discharging volume operation. Thereby, the discharge pressure in the regurgitation room 32 acts on the other end side of a valve element 42, overcomes the elastic force of a coil spring 46, moves a valve element 42 rightward [space], and closes the bypass way 40. Therefore, the maximum discharging volume operation can be performed.

[0026] On the other hand, a solenoid valve 41 is closed at the time of variable-capacity operation (refer to drawing 7). Thereby, since the discharge pressure in the regurgitation room 32 stops acting on the other end side of a valve element 42, a valve element 42 moves leftward [space] according to the elastic force of a coil spring 46. Therefore, since the bypass way 40 opens, variable-capacity operation can be performed. By the way, with an above-mentioned operation gestalt, although the bypass way 40 was formed in the cylinder block 2, external piping which makes cam-plate room 38a and the free passage way 30 open for free passage can be arranged out of a cam-plate mold compressor, and this

invention can be carried out also as a bypass way 40.

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TECHNICAL FIELD

[Field of the Invention] This invention uses for a refrigerating cycle about a two-stage compression-type variable-capacity cam-plate mold compressor and is suitable.

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PRIOR ART

[Description of the Prior Art] A two-stage compression-type cam-plate mold compressor changes rotation of a revolving shaft into a reciprocating motion as everyone knows through the cam plate aslant arranged to a revolving shaft, and carries out movable [of the dual leadership piston]. A fluid is compressed at the 1st actuation room formed in the end side of this dual leadership piston, and after that, the fluid compressed at the 1st actuation room is led to the 2nd actuation room formed in the other end side, and is compressed again.
[0003] Moreover, as a variable-capacity-type cam-plate mold compressor, by JP,55-160187,A, the fluid breathed out from two or more actuation rooms is gathered in two or more regurgitation rooms, and what makes discharging volume adjustable is devised by controlling the closing motion valve which opens the breathed-out fluid to an inhalatorium.

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TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] However, since a design given in the above-mentioned official report must form two or more regurgitation rooms, the configuration of front housing with which a regurgitation room is formed, and rear housing ** will become complicated, and it will cause enlargement and manufacturing cost lifting of both housing, as a result will cause manufacturing cost lifting of a cam-plate mold compressor.
[0005] This invention aims at realizing a variable-capacity function cheaply in a two-stage compression-type cam-plate mold compressor in view of the point describing above.

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MEANS

[Means for Solving the Problem] In order to attain the above-mentioned object, the following technical means are used for this invention. The inhalation way which the diameter size methods of the 1st and 2 piston section (8b, 8a) of a dual leadership piston (8) differ mutually, and leads a fluid to two or more 1st actuation rooms (38) further in invention according to claim 1 to 3 (24, 38a, 27, 29), It is characterized by arranging a closing motion valve (41) in the bypass way (40) which makes the repressing free passage way (28, 30, 31) which the fluid breathed out from two or more 1st actuation rooms (38) is gathered, and leads it to two or more 2nd actuation rooms (39) open for free passage.
[0007] if this closes a closing motion valve (41) so that it may mention later, the fluid compressed at the 1st actuation room (38) should pass a repressing free passage way (28, 30, 31) -- it is inhaled and repressed by the 2nd actuation room (39). That is, the discharging volume in the condition of having closed the closing motion valve (41) is determined by the volume of the 1st actuation room (38). On the other hand, if a closing motion valve (41) is opened, since the pressure of the fluid compressed at the 1st actuation room (38) will become equal to the pressure in an inhalation way (24, 38a, 27, 29), i.e., suction pressure, the work of compression in the 1st actuation room (38) turns into lost work. and a fluid should pass an inhalation way (24, 38a, 27, 29) and a repressing free passage way (28, 30, 31) -- since it is inhaled and compressed by the 2nd actuation room (39), the discharging volume in the condition of having opened the closing motion valve (41) is determined by the volume of the 2nd actuation room (39).
[0008] Moreover, since the diameter size methods of the 1st and 2 piston section (8b, 8a) differ mutually, the volume of a 1st and 2 actuation room (38 39) also differs mutually. That is, the capacity of a cam-plate mold compressor changes with closing motion actuation of a closing motion valve (41). As stated above, the diameter size method of the 1st and 2 piston section (8b, 8a) is changed mutually. With and a simple means to open and close the bypass way (40) which makes an inhalation way (24, 38a, 27, 29) and a repressing free passage way (28, 30, 31) open for free passage Since the variable-capacity device of a cam-plate mold compressor is realizable, manufacturing cost lifting of a cam-plate mold compressor can be controlled.
[0009] In invention according to claim 2, the diameter size method of the 1st piston section (8b) is characterized by being smaller than the diameter size method of the 2nd piston section (8a). In invention according to claim 3, a bypass way (40) is characterized by being formed in housing (1, 2, 3, 4). In addition, the sign in the parenthesis of each above-mentioned means shows response relation with the concrete means given in an operation gestalt mentioned later.
[0010]
[Embodiment of the Invention] Hereafter, the gestalt of the operation which shows this invention in drawing is explained.
(The 1st operation gestalt) The cam-plate mold compressor concerning this operation gestalt is a thing at the time of using for the refrigerating cycle which uses a refrigerant with the high working pressure of a carbon dioxide (CO2) etc., and drawing 1 shows the shaft-orientations cross section of the cam-plate mold compressor (it is only hereafter called a compressor.) concerning this invention.

[0011] 5 is the revolving shaft which obtains the driving force from external driving sources (engine for car transit etc.), and rotates through the electromagnetic clutch which is not illustrated, and this revolving shaft 5 is held pivotable by the radial bearing 13 and 14 and thrust bearing 11 and 12 which have been arranged at cylinder blocks (housing) 2 and 3. Here, radial bearing 13 and 14 opposed the load of the perpendicular direction of a revolving shaft 5, and thrust bearing 11 and 12 has opposed the axial load of a revolving shaft 5.

[0012] In a cylinder block 2 and 3, centering on a revolving shaft 5, parallel, and a revolving shaft 5, Cylinders 9a and 9b are formed in the location equally divided into three in the hoop direction, and cylinder 9b is formed for cylinder 9a with a total of six three at the cylinder block 2 side at the three and cylinder block 3 side. Moreover, two or more 1st actuation rooms 38 and 2nd actuation rooms 39 are formed in both the cylinders 9a and 9b for the dual leadership piston 8 which has the 1st and 2 piston sections 8b and 8a from which a diameter size method differs on shaft-orientations order both sides, respectively of an insertion **** cage, this dual leadership piston 8, and both the cylinders 9b and 9a. In addition, with this operation gestalt, since the diameter size method of 1st piston section 8b is larger than the diameter size method of 2nd piston section 8a, the volume of the 1st actuation room 38 becomes larger than the volume of the 2nd actuation room 39.

[0013] The dual leadership piston 8 is driven with the specified quantity ****** cam plate 6 to the revolving shaft combined with the revolving shaft 5, and this cam plate 6 changes rotation of a revolving shaft 5 into a reciprocating motion, and it makes the dual leadership piston 8 reciprocate in both cylinder 9a and 9b. In addition, between the cam plate 6 and the dual leadership piston 8, the shoe 7 of a couple is arranged so that both may exercise smoothly, and three dual leadership pistons 8 are arranged at the circumference of a revolving shaft 5, as shown in drawing 2 and 3.

[0014] The inhalation opening 24 which inhales the refrigerant which flowed into the cylinder block 2 the evaporator of the refrigerating cycle which is not illustrated is formed, and this inhalation opening 24 is open for free passage to cam-plate room 38a which both the cylinder blocks 2 and the cam plate 6 formed in three rotate. Moreover, the valve plates 15 and 16 which blockade both the actuation room 38, the suction valve portions 21 and 22 which prevent the back run of the refrigerant inhaled in 39, and both the cylinders 9a and 9b are arranged at the end face of both the cylinder blocks 2 and 3. It is fixed to the valve plate 15 with the bolt with which the valve basalia 18 to which the inhalation opening 34 which is open for free passage to cylinder 9a, and a delivery 35 regulate the maximum opening of the discharge valve 17 which prevents the back run of the refrigerant breathed out from the actuation room 39 in the delivery 35 of the opposite hand of formation **** cage and cylinder 9a, and this discharge valve 17 to a valve plate 15 is not illustrated. Similarly the inhalation opening 25 and the delivery 26 which are open for free passage to cylinder 9b are formed in the valve plate 16, and it is fixed to the valve plate 16 with the bolt with which a discharge valve 19 and the valve basalia 20 are not illustrated in the delivery 26 of the opposite hand of cylinder 9b.

[0015] In addition, a valve plate 15 and a discharge valve 17 are pinched by the front housing 1 and the cylinder block 2, and are ******(ed) by the bolt 37. Similarly, a valve plate 16 and a discharge valve 19 are pinched by the rear housing 4 and the cylinder block 3, and are ******(ed) by the bolt 36. In the front housing 1, the shaft sealing 10 which prevents that a refrigerant leaks from the clearance between the front housing 1 and a revolving shaft 5 to the exterior has been arranged, and this shaft sealing 10 has prevented the leakage of a refrigerant in contact with end-face 10b of ring 10a pressed fit in the revolving shaft 5. And the inhalation opening 34, the front intermediate pressure room 31 open for free passage and the delivery 35, and the regurgitation room 32 open for free passage are formed in the front housing 1.

[0016] In addition, as the front intermediate pressure room 31 is shown in drawing 2 , the refrigerant is distributed to three inhalation openings 34 formed in the front housing 1, and the regurgitation room 32 gathers the refrigerant breathed out from three deliveries 35 formed in the front housing 1, and carries out the regurgitation of the refrigerant to the condenser of the refrigerating cycle which is not illustrated from the delivery 23 formed in the front housing 1.

[0017] Moreover, as shown in the rear housing 4 at drawing 1 , the inhalation opening 25, the

inhalatorium 27 open for free passage and the delivery 26, and the rear intermediate pressure room 28 open for free passage are formed, and the inhalatorium 27 is open for free passage with cam-plate room 38a with the free passage way 29. Furthermore, the rear intermediate pressure room 28 is open for free passage with the front intermediate pressure room 31 of the front housing 1 with the free passage way 30 formed in cylinder blocks 2 and 3.

[0018] In addition, the inhalatorium 27 has distributed the refrigerant to three inhalation openings 25 formed in the rear housing 4, and the rear intermediate pressure room 28 gathers the refrigerant breathed out from three deliveries 26 formed in the rear housing 4, and it is making the free passage way 30 open it for free passage, as shown in drawing 3 . Moreover, 40 is a bypass way (formed in the broken-line section and space back side.) which makes cam-plate room 38a and the free passage way 30 open for free passage, and 41 is the non-energizing **** type solenoid valve (closing motion valve) 41 which opens and closes the bypass way 40. This solenoid valve 41 consists of stopper section (fixed iron core) 41c which opposes plunger 41b which serves both as yoke housing section 41a which makes the magnetic path of the solenoid valve 41 united with the cylinder block 2, and the valve element which opens and closes the bypass way 40 and a moving core (plunger), and plunger 41b, coil-spring 41d for the returns of plunger 41b, and exiting coil 41e.

[0019] And as shown in drawing 4 , it is controlled by the control unit 42 and the signal from the coolant temperature sensor which detects the circulating water temperature which flows into the heater core for heating which is not illustrated, and the air conditioning sensor S which detects information required to control air conditioners, such as a sensor, whenever [vehicle outdoor temperature sensor or vehicle room air temperature] is inputted into this control unit 42, and the solenoid valve 41 is controlling said electromagnetic-clutch EC and solenoid valve 41 based on these signals.

[0020] In addition, after extent time amount passed the solenoid valve 41 several seconds (about 2 - 3 seconds) an aperture and after that in connection of an electromagnetic clutch and coincidence, it controlled by this operation gestalt to close a solenoid valve 41, and the displeasure of the crew at the time of electromagnetic-clutch connection is controlled. Next, actuation of the compressor concerning this operation gestalt is described.

1. Maximum Discharging Volume Operation (Condition Which Closed Solenoid Valve 41)

The low-pressure refrigerant (this operation gestalt about 35 kgf/cm2) inhaled from the inhalation opening 24 is breathed out by the rear intermediate pressure room 28, after being inhaled at the 1st actuation room 38 through cam-plate room 38a, the free passage way 29, an inhalatorium 27, and the inhalation way that results in the inhalation opening 25 and compressing even intermediate pressure (this operation gestalt about 60 kgf/cm2). Furthermore, a refrigerant is inhaled at the 2nd actuation room 39 through the free passage way 30, the front intermediate pressure room 31, and the repressing free passage way that results in the inhalation opening 34. Then, a refrigerant is compressed to a discharge pressure (this operation gestalt about 110 kgf/cm2) at the 2nd actuation room 39, and carries out the regurgitation to the compressor exterior from a delivery 23 through the regurgitation room 32. Therefore, two steps of refrigerants are compressed at the 1st actuation room 38 and the 2nd actuation room 39 (refer to drawing 1).

[0021] 2. Variable-Capacity Operation (Condition Which Opened Solenoid Valve 41)

It is inhaled at the 1st actuation room 38 through cam-plate room 38a, the free passage way 29, an inhalatorium 27, and the inhalation opening 25, even intermediate pressure is compressed, and the low-pressure refrigerant inhaled from the inhalation opening 24 is breathed out by the rear intermediate pressure room 28. However, since the bypass way 40 is open, rear intermediate pressure room 28 internal pressure becomes equal to cam-plate room 38a internal pressure (inlet pressure).

[0022] Thereby, since the work of compression in the 1st actuation room 38 turns into lost work, after being inhaled at the 2nd actuation room 39 through cam-plate room 38a, the free passage way 30, the front intermediate pressure room 31, and the inhalation opening 34, the refrigerant inhaled from the inhalation opening 24 is compressed at the 2nd actuation room 39, and is breathed out by the compressor exterior from a delivery 23 through the regurgitation room 32. And since the volume of the 2nd actuation room 39 is smaller than the volume of the 1st actuation room 38, the amount of

refrigerants breathed out from a delivery 23 (inhaled by 2nd actuation room 39), i.e., a mass flow rate, decreases (refer to drawing 5).

[0023] Next, the description of this operation gestalt is described. According to this operation gestalt, the bypass way 40 which makes cam-plate room 38a and the free passage way 30 open for free passage is formed, and with a simple means to open and close this bypass way 40, since a good capacity device is realizable, manufacturing cost lifting of the two-stage compression-type cam-plate mold compressor which has a variable-capacity function can be controlled.

[0024] (The 2nd operation gestalt) This operation gestalt did not open and close the bypass way 40 directly with a solenoid valve 41, but as shown in drawing 6 , it carried out closing motion actuation of the valve element 42 which opens and closes the bypass way 40 directly indirectly with the solenoid valve 41 (it considered as the pilot type). That is, a valve element 42 forms the free passage way 44 which makes the rear intermediate pressure room 28 open for free passage the end side of the cylinder 43 contained possible [a reciprocating motion], and the free passage way 45 which makes the regurgitation room 32 open an other end side for free passage, and arranges a solenoid valve 41 in the free passage way 45. In addition, 46 is a coil spring for the returns of a valve element 42.

[0025] Next, actuation of this operation gestalt is described. Unlike the 1st operation gestalt, a solenoid valve 41 is opened at the time of the maximum discharging volume operation. Thereby, the discharge pressure in the regurgitation room 32 acts on the other end side of a valve element 42, overcomes the elastic force of a coil spring 46, moves a valve element 42 rightward [space], and closes the bypass way 40. Therefore, the maximum discharging volume operation can be performed.

[0026] On the other hand, a solenoid valve 41 is closed at the time of variable-capacity operation (refer to drawing 7). Thereby, since the discharge pressure in the regurgitation room 32 stops acting on the other end side of a valve element 42, a valve element 42 moves leftward [space] according to the elastic force of a coil spring 46. Therefore, since the bypass way 40 opens, variable-capacity operation can be performed. By the way, with an above-mentioned operation gestalt, although the bypass way 40 was formed in the cylinder block 2, external piping which makes cam-plate room 38a and the free passage way 30 open for free passage can be arranged out of a cam-plate mold compressor, and this invention can be carried out also as a bypass way 40.

[Translation done.]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DESCRIPTION OF DRAWINGS

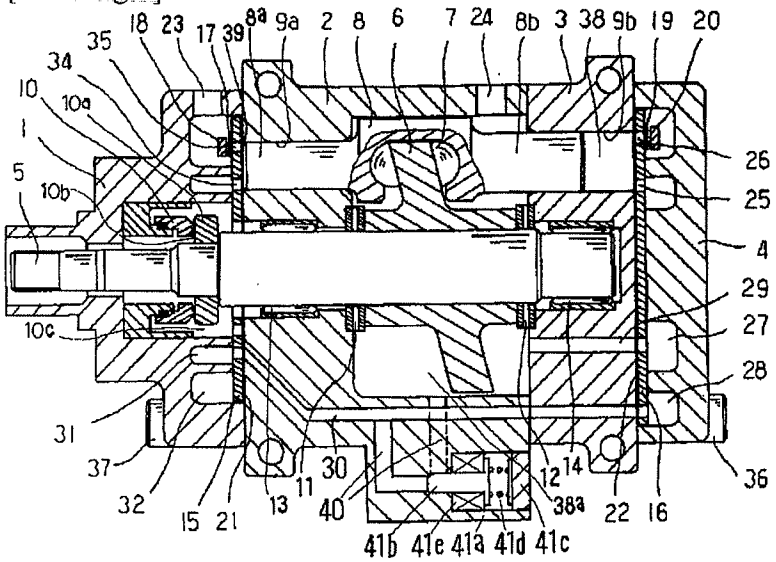
[Brief Description of the Drawings]
[Drawing 1] It is the axial sectional view of the cam-plate mold compressor concerning the 1st operation gestalt.
[Drawing 2] It is the front view which looked at the front housing 1 from the cam-plate room 38a side.
[Drawing 3] It is the front view which looked at the rear housing 4 from the cam-plate room 38a side.
[Drawing 4] It is the block diagram showing the control system of a cam-plate mold compressor.
[Drawing 5] It is the axial sectional view of the cam-plate mold compressor in which the time of variable-capacity operation is shown.
[Drawing 6] It is the axial sectional view of the cam-plate mold compressor concerning the 2nd operation gestalt.
[Drawing 7] It is the axial sectional view of the cam-plate mold compressor in which the time of variable-capacity operation is shown.
[Description of Notations]
1 -- 2 Front housing, 3 -- A cylinder block, 4 -- Rear housing, 5 [-- A dual leadership piston, 9a, 9b / -- Cylinder,] -- A revolving shaft, 6 -- A cam plate, 7 -- A shoe, 8 10 -- 11 Shaft sealing, 12 -- 13 Thrust bearing, 14 -- Radial bearing, 15 16 [-- Discharge valve,] -- A valve plate, 17 -- A discharge valve, 18 -- Valve basalia, 19 20 [-- Inhalation opening,] -- 21 Valve basalia, 22 -- A suction valve portion, 23 -- A delivery, 24 25 [-- A medium room, 29 / -- A free passage way, 30 / -- A free passage way, 31 / -- A medium room, 32 / -- A regurgitation room, 34 / -- Inhalation opening, 35 / -- 36 A delivery, 37 / -- A bolt, 38 / -- The 1st actuation room, 39 / -- The 2nd actuation room, 40 / -- A bypass way, 41 / -- Solenoid valve.] -- Inhalation opening, 26 -- A delivery, 27 -- An inhalatorium, 28

[Translation done.]

* NOTICES *

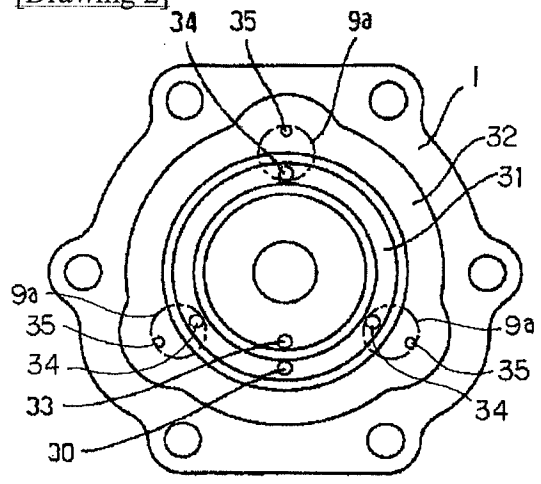
DRAWINGS

[Drawing 1]

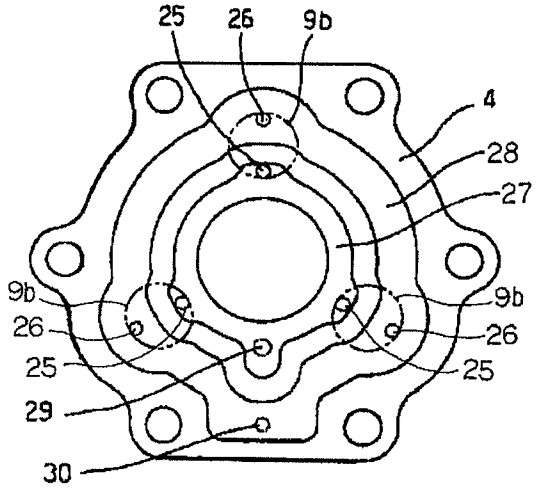


11, 12：スラスト軸受　30：連通路　39：第２作動室
23：吹出口　38：第１作動室　40：バイパス路
24：吸込口　38a：斜板室　41：電磁弁

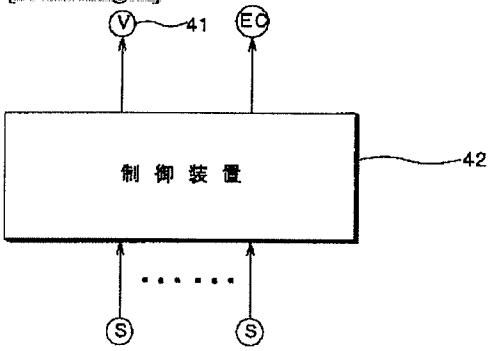
[Drawing 2]



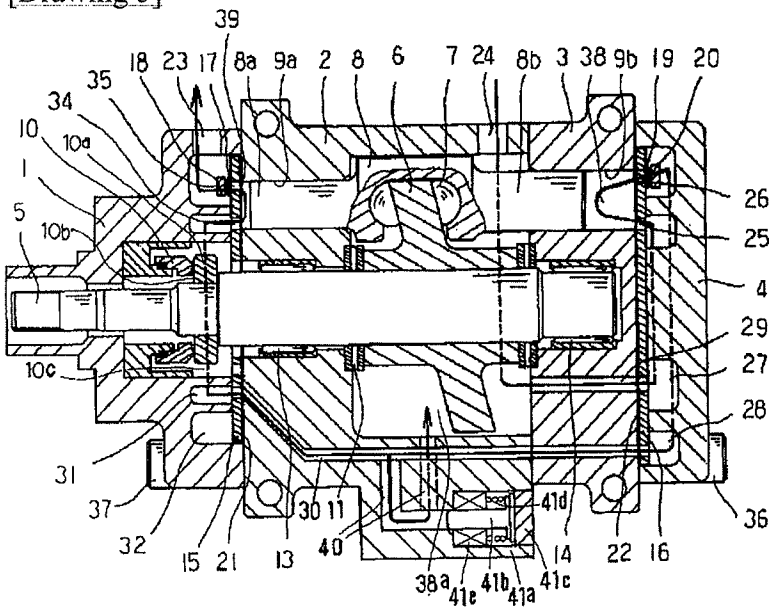
[Drawing 3]



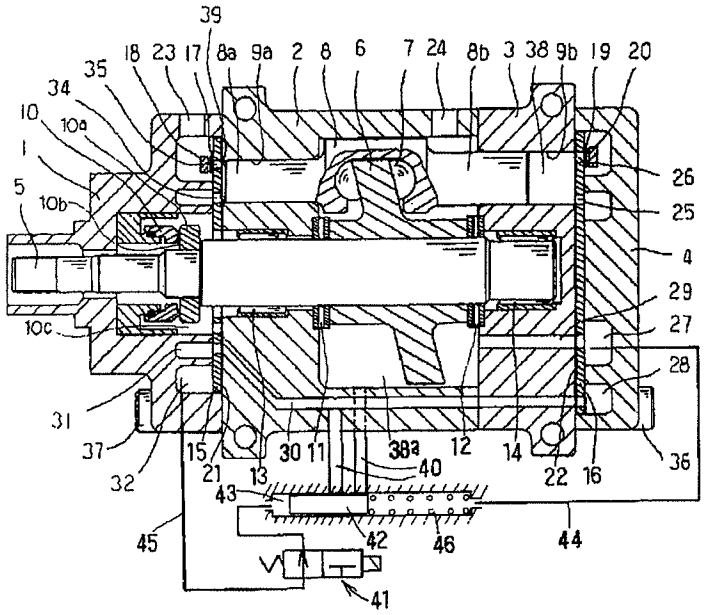
[Drawing 4]



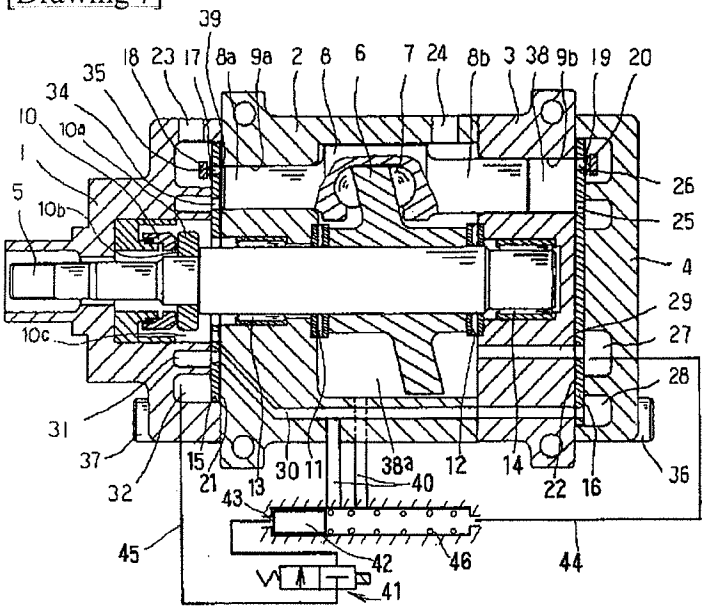
[Drawing 5]



[Drawing 6]



[Drawing 7]



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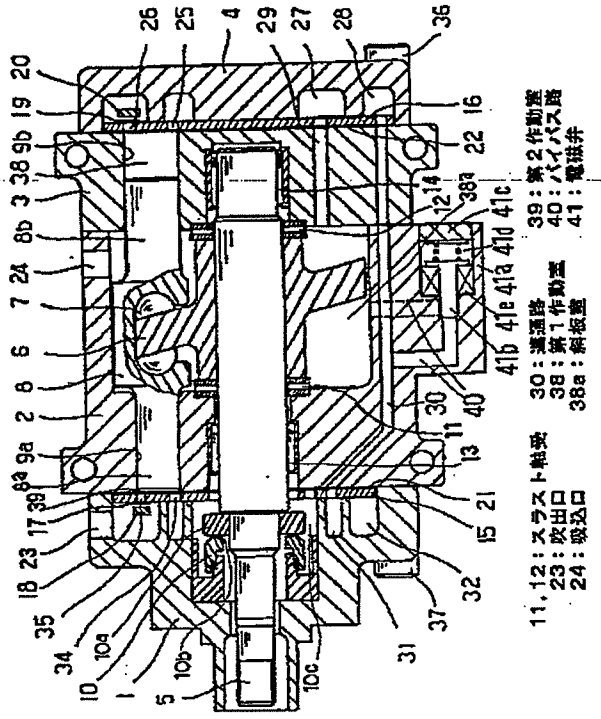
(54)【発明の名称】　斜板型圧縮機

(57)【要約】

【課題】　二段圧縮式の斜板型圧縮機において、安価に可変容量機能を実現する。

【解決手段】　第１ピストン部８ｂの径寸法を第２ピストン部８ａの径寸法より大きくし、斜板室３８ａと連通路３０とを連通させるバイパス路４０の開閉を行う。これにより、バイパス路４０を閉じたときの斜板型圧縮機容量は、第１作動室３８の体積で決定し、バイパス路４０を開いたときの斜板型圧縮機容量は、第２作動室３９の体積で決定する。したがって、バイパス路４０の開閉により可変容量機構を実現することができる。



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【特許請求の範囲】

【請求項1】　駆動力を得て回転する回転軸（5）と、前記回転軸（5）を回転可能に保持収納するハウジング（1、2、3、4）と、

前記ハウジング（2、3）内に前記回転軸（5）と平行に形成された複数個のシリンダ（9a、9b）と、

前記シリンダ（9a、9b）内で往復運動し、軸方向前後両側に径寸法の異なる第1、2ピストン部（8b、8a）を有する双頭ピストン（8）と、

前記回転軸（5）に設けられ、前記回転軸（5）の回転運動を往復運動に変換して前記双頭ピストン（8）を往復運動させる斜板（6）と、

前記シリンダ（9a、9b）と前記第1ピストン部（8b）とによって形成される複数個の第1作動室（38）と、

前記シリンダ（9a、9b）と前記第2ピストン部（8a）とによって形成される複数個の第2作動室（39）と、

前記ハウジング（1、2、3、4）に形成され、流体を前記複数個の第1作動室（38）に導く吸入路（24、38a、27、29）と、

前記複数個の第1作動室（38）から吐出した流体を集合させて前記複数個の第2作動室（39）に導く再圧縮連通路（28、30、31）と、

前記吸入路（24、38a、27、29）と前記再圧縮連通路（28、30、31）とを連通させるバイパス路（40）と、

前記バイパス路（40）を開閉する開閉弁（41）とを有し、

前記第1ピストン部（8b）の径寸法は、前記第2ピストン部（8a）の径寸法より大きいことを特徴とすることを特徴とする斜板型圧縮機。

【請求項2】　前記バイパス路（40）は、前記ハウジング（1、2、3、4）に形成されていることを特徴とする請求項1に記載の斜板型圧縮機。

【発明の詳細な説明】

【0001】

【発明の属する技術分野】本発明は、二段圧縮式の可変容量斜板型圧縮機に関するものであり、冷凍サイクルに用いて好適である。

【0002】

【従来の技術】二段圧縮式の斜板型圧縮機は、周知のように、回転軸に対して斜めに配置された斜板を介して回転軸の回転運動を往復運動に変換して双頭ピストンを可動し、この双頭ピストンの一端側に形成された第1作動室で流体の圧縮を行い、その後、第1作動室で圧縮された流体を他端側に形成された第2作動室に導き再び圧縮するものである。

【0003】また、可変容量式の斜板型圧縮機として、例えば特開昭55－160187号公報では、複数個の

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作動室から吐出された流体を複数個の吐出室に集合させ、吐出された流体を吸入室に開放する開閉弁を制御することにより吐出容量を可変とするものが考案されている。

【0004】

【発明が解決しようとする課題】しかし、上記公報に記載の考案は、複数個の吐出室を形成しなければならないため、吐出室が形成されるフロントハウジングおよびリアハウジングにの形状が複雑になり、両ハウジングの大型化および製造原価上昇を招き、延いては、斜板型圧縮機の製造原価上昇を招いてしまう。

【0005】本発明は、上記点に鑑み、二段圧縮式の斜板型圧縮機において、安価に可変容量機能を実現することを目的とする。

【0006】

【課題を解決するための手段】本発明は、上記目的を達成するために、以下の技術的手段を用いる。請求項1～3に記載の発明では、双頭ピストン（8）の第1、2ピストン部（8b、8a）の径寸法は互いに異なっており、さらに、流体を複数個の第1作動室（38）に導く吸入路（24、38a、27、29）と、複数個の第1作動室（38）から吐出した流体を集合させて複数個の第2作動室（39）に導く再圧縮連通路（28、30、31）とを連通させるバイパス路（40）に開閉弁（41）を配設することを特徴とする。

【0007】これにより、後述するように、開閉弁（41）を閉じると、第1作動室（38）にて圧縮された流体は、再圧縮連通路（28、30、31）を経て第2作動室（39）に吸入されて再圧縮される。つまり、開閉弁（41）を閉じた状態の吐出容量は、第1作動室（38）の体積で決定される。一方、開閉弁（41）を開くと、第1作動室（38）にて圧縮された流体の圧力は、吸入路（24、38a、27、29）内の圧力、すなわち吸入圧力と等しくなるので、第1作動室（38）での圧縮仕事は無効仕事となる。そして、流体は、吸入路（24、38a、27、29）および再圧縮連通路（28、30、31）を経て第2作動室（39）に吸入されて圧縮されるので、開閉弁（41）を開いた状態の吐出容量は、第2作動室（39）の体積で決定される。

【0008】また、第1、2ピストン部（8b、8a）の径寸法は互いに異なっているので、第1、2作動室（38、39）の体積も互いに異なっている。つまり、開閉弁（41）の開閉作動によって斜板型圧縮機の容量が変化する。以上に述べたように、第1、2ピストン部（8b、8a）の径寸法を互いに異ならせ、かつ、吸入路（24、38a、27、29）と再圧縮連通路（28、30、31）とを連通させるバイパス路（40）を開閉するといった簡便な手段で、斜板型圧縮機の可変容量機構を実現することができるので、斜板型圧縮機の製造原価上昇を抑制することができる。

【0009】請求項2に記載の発明では、第1ピストン部（8b）の径寸法は、第2ピストン部（8a）の径寸法より小さいことを特徴とする。請求項3に記載の発明では、バイパス路（40）は、ハウジング（1、2、3、4）に形成されていることを特徴とする。なお、上記各手段の括弧内の符号は、後述する実施形態記載の具体的手段との対応関係を示すものである。

【0010】

【発明の実施の形態】以下、本発明を図に示す実施の形態について説明する。

（第1実施形態）本実施形態に係る斜板型圧縮機は、二酸化炭素（CO_2）等の作動圧力の高い冷媒を使用する冷凍サイクルに用いた場合のものであり、図1は、本発明に係る斜板型圧縮機（以下、単に圧縮機と呼ぶ。）の軸方向断面を示している。

【0011】5は図示されていない電磁クラッチを介して外部駆動源（車両走行用エンジン等）からの駆動力を得て回転する回転軸で、この回転軸5はシリンダブロック（ハウジング）2、3に配置されたラジアル軸受13、14およびスラスト軸受11、12によって回転可能に保持されている。ここで、ラジアル軸受13、14は回転軸5の垂直方向の荷重に対抗し、スラスト軸受11、12は回転軸5の軸方向荷重に対抗している。

【0012】シリンダブロック2、3内には、回転軸5と平行、かつ、回転軸5を中心として周方向に3等分する位置にシリンダ9a、9bが形成されており、シリンダブロック2側にはシリンダ9aが3つ、シリンダブロック3側にはシリンダ9bが3つと合計6つ形成されている。また、両シリンダ9a、9bには、軸方向前後両側に径寸法の異なる第1、2ピストン部8b、8aを有する双頭ピストン8が挿入れており、この双頭ピストン8および両シリンダ9b、9aによって第1作動室38および第2作動室39がそれぞれ複数個形成されている。なお、本実施形態では、第1ピストン部8bの径寸法が、第2ピストン部8aの径寸法より大きくなっているので、第1作動室38の体積が、第2作動室39の体積より大きくなる。

【0013】双頭ピストン8は、回転軸5に結合された回転軸に対して所定量傾いた斜板6によって駆動され、この斜板6は、回転軸5の回転運動を往復運動に変換して双頭ピストン8を両シリンダ9a、9b内に往復運動させる。なお、斜板6と双頭ピストン8との間には、両者が滑らかに運動するように一対のシュー7が配置されており、双頭ピストン8は図2、3に示されるように、回転軸5周りに3本配置されている。

【0014】シリンダブロック2には、図示されていない冷凍サイクルの蒸発器を流出した冷媒を吸入する吸入口24が形成されており、この吸入口24は、両シリンダブロック2、3内に形成される斜板6が回転する斜板室38aに連通している。また、両シリンダブロック

2、3の端面には、両作動室38、39内に吸入された冷媒の逆流を防止する吸入弁21、22および両シリンダ9a、9bを閉塞するバルブプレート15、16が配置されている。バルブプレート15にはシリンダ9aに連通する吸入口34と吐出口35が形成れており、シリンダ9aの反対側の吐出口35には、作動室39から吐出した冷媒の逆流を防止する吐出弁17と、この吐出弁17の最大開度を規制する弁止板18とが図示されていないボルトによってバルブプレート15に固定されている。同様に、バルブプレート16には、シリンダ9bに連通する吸入口25と吐出口26が形成されており、シリンダ9bの反対側の吐出口26には吐出弁19と弁止板20とが図示されていないボルトによってバルブプレート16に固定されている。

【0015】なお、バルブプレート15および吐出弁17はフロントハウジング1とシリンダブロック2とによって挟まれてボルト37によって共締めされている。同様に、バルブプレート16および吐出弁19はリアハウジング4とシリンダブロック3とによって挟まれてボルト36によって共締めされている。フロントハウジング1には、フロントハウジング1と回転軸5との隙間から冷媒が外部へ漏れることを防止する軸シール10が配置され、この軸シール10は回転軸5に圧入されたリング10aの端面10bに接して冷媒の漏れを防止している。そして、フロントハウジング1には、吸入口34と連通するフロント中間圧室31および吐出口35と連通する吐出室32が形成されている。

【0016】なお、フロント中間圧室31は、図2に示すように、フロントハウジング1に形成された3つの吸入口34に冷媒を分配しており、吐出室32はフロントハウジング1に形成された3つの吐出口35から吐出した冷媒を集合させて、フロントハウジング1に形成された吐出口23より図示されていない冷凍サイクルの凝縮器に冷媒を吐出する。

【0017】また、リアハウジング4には、図1に示すように、吸入口25と連通する吸入室27および吐出口26と連通するリア中間圧室28が形成されており、吸入室27は連通路29により斜板室38aと連通している。さらに、リア中間圧室28は、シリンダブロック2、3に形成された連通路30によってフロントハウジング1のフロント中間圧室31と連通している。

【0018】なお、吸入室27は、図3に示すように、リアハウジング4に形成された3つの吸入口25に冷媒を分配しており、リア中間圧室28はリアハウジング4に形成された3つの吐出口26から吐出した冷媒を集合させて連通路30に連通させている。また、40は、斜板室38aと連通路30とを連通させるバイパス路（破線部、紙面奥側に形成されている。）であり、41はバイパス路40を開閉する非通電磁閉型の電磁弁（開閉弁）41である。この電磁弁41は、シリンダブロック

２と一体化された電磁弁４１の磁路をなすヨークハウジング部４１ａと、バイパス路４０を開閉する弁体と可動鉄心（プランジャ）とを兼ねるプランジャ４１ｂと、プランジャ４１ｂと対抗するストッパ部（固定鉄心）４１ｃと、プランジャ４１ｂのリターン用のコイルバネ４１ｄと、励磁コイル４１ｅとから構成されている。

【００１９】そして、電磁弁４１は、図４に示すように、制御装置４２によって制御されており、この制御装置４２には、図示されていない暖房用ヒータコアに流入する冷却水温度を検出する水温センサ、および車室外温度センサや車室内温度センサ等の空調装置を制御するに必要な情報を検出する空調センサＳからの信号が入力されており、これらの信号に基づいて前記電磁クラッチＥＣおよび電磁弁４１を制御している。

【００２０】なお、本実施形態では、電磁クラッチの接続と同時に電磁弁４１を開き、その後、数秒（２～３秒程度）程度時間が経過した後に電磁弁４１を閉じるように制御して、電磁クラッチ接続時の乗員の不快感を抑制している。次に、本実施形態に係る圧縮機の作動を述べる。

１．最大吐出容量運転（電磁弁４１を閉じた状態）

吸入口２４から吸入された低圧の冷媒（本実施形態では、約３５ｋｇｆ／ｃｍ²）は、斜板室３８ａ、連通路２９、吸入室２７、吸入口２５に至る吸入路を経て第１作動室３８に吸入され、中間圧（本実施形態では、約６０ｋｇｆ／ｃｍ²）まで圧縮された後、リア中間圧室２８に吐出される。さらに、冷媒は連通路３０、フロント中間圧室３１、吸入口３４に至る再圧縮連通路を経て第２作動室３９に吸入される。その後、冷媒は第２作動室３９にて吐出圧（本実施形態では、約１１０ｋｇｆ／ｃｍ²）まで圧縮されて、吐出室３２を経て吐出口２３より圧縮機外部に吐出する。したがって、冷媒は、第１作動室３８と第２作動室３９とで２段圧縮される（図１参照）。

【００２１】２．可変容量運転（電磁弁４１を開いた状態）

吸入口２４から吸入された低圧の冷媒は、斜板室３８ａ、連通路２９、吸入室２７、吸入口２５を経て第１作動室３８に吸入され、中間圧まで圧縮されてリア中間圧室２８に吐出される。しかし、バイパス路４０が開いているので、リア中間圧室２８内圧は、斜板室３８ａ内圧（吸入圧）に等しくなる。

【００２２】これにより、第１作動室３８での圧縮仕事は無効仕事となるので、吸入口２４から吸入された冷媒は、斜板室３８ａ、連通路３０、フロント中間圧室３１、吸入口３４を経て第２作動室３９に吸入された後、第２作動室３９にて圧縮されて吐出室３２を経て吐出口２３より圧縮機外部に吐出される。そして、第２作動室３９の体積は、第１作動室３８の体積より小さいので、吐出口２３より吐出される（第２作動室３９によって吸入される）冷媒量、すなわち質量流量が減少する（図５参照）。

【００２３】次に、本実施形態の特徴を述べる。本実施形態によれば、斜板室３８ａと連通路３０とを連通させるバイパス路４０を設け、このバイパス路４０の開閉を行うといった簡便な手段で、可容量機構を実現することができるので、可変容量機能を有する二段圧縮式の斜板型圧縮機の製造原価上昇を抑制することができる。

【００２４】（第２実施形態）本実施形態は、バイパス路４０の開閉を電磁弁４１で直接行わず、図６に示すように、バイパス路４０の開閉を直接行う弁体４２を電磁弁４１により間接的に開閉作動させた（パイロット式とした）ものである。すなわち、弁体４２が往復運動可能に収納されたシリンダ４３の一端側をリア中間圧室２８に連通させる連通路４４と、他端側を吐出室３２に連通させる連通路４５とを設け、連通路４５に電磁弁４１を配設する。なお、４６は弁体４２のリターン用のコイルバネである。

【００２５】次に、本実施形態の作動を述べる。最大吐出容量運転時は、第１実施形態と異なり電磁弁４１を開く。これにより、吐出室３２内の吐出圧が弁体４２の他端側に作用し、コイルバネ４６の弾性力に打ち勝って弁体４２を紙面右方向に移動させてバイパス路４０を閉じる。したがって、最大吐出容量運転を行うことができる。

【００２６】一方、可変容量運転時（図７参照）は、電磁弁４１を閉じる。これにより、弁体４２の他端側に吐出室３２内の吐出圧が作用しなくなるので、弁体４２はコイルバネ４６の弾性力により紙面左方向に移動する。したがって、バイパス路４０が開くので、可変容量運転を行うことができる。ところで、上述の実施形態では、バイパス路４０をシリンダブロック２内に形成したが、斜板室３８ａと連通路３０を連通させる外部配管を斜板型圧縮機外に配設してバイパス路４０としても本発明を実施することができる。

【図面の簡単な説明】

【図１】第１実施形態に係る斜板型圧縮機の軸方向断面図である。

【図２】フロントハウジング１を斜板室３８ａ側から見た正面図である。

【図３】リアハウジング４を斜板室３８ａ側から見た正面図である。

【図４】斜板型圧縮機の制御系を示すブロック図である。

【図５】可変容量運転時を示す斜板型圧縮機の軸方向断面図である。

【図６】第２実施形態に係る斜板型圧縮機の軸方向断面図である。

【図７】可変容量運転時を示す斜板型圧縮機の軸方向断面図である。

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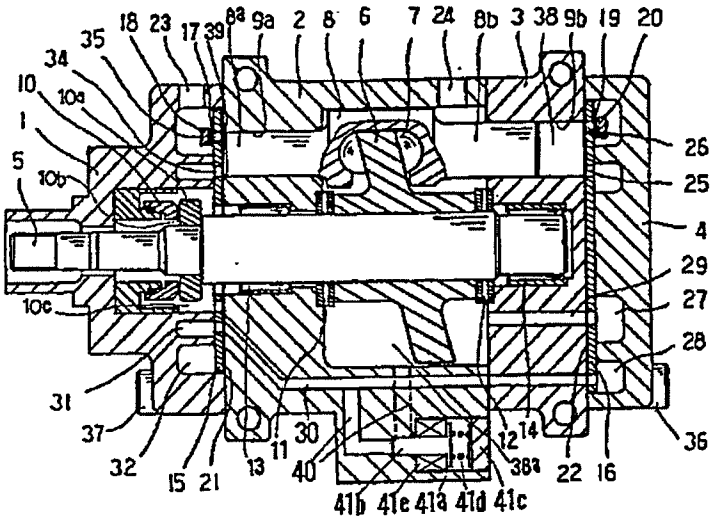
【符号の説明】

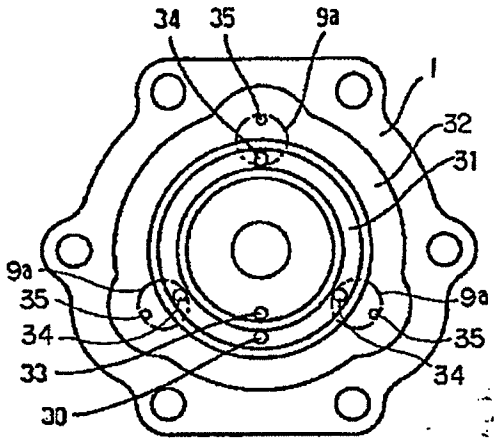
1…フロントハウジング、2、3…シリンダブロック、4…リアハウジング、5…回転軸、6…斜板、7…シュー、8…双頭ピストン、9a、9b…シリンダ、10…軸シール、11、12…スラスト軸受、13、14…ラジアル軸受、15、16…バルブプレート、17…吐出弁、18…弁止板、19…吐出弁、20…弁止板、21、22…吸入弁、23…吐出口、24…吸入口、25…吸入口、26…吐出口、27…吸入室、28…中間室、29…連通路、30…連通路、31…中間室、32…吐出室、34…吸入口、35…吐出口、36、37…ボルト、38…第1作動室、39…第2作動室、40…バイパス路、41…電磁弁。

8

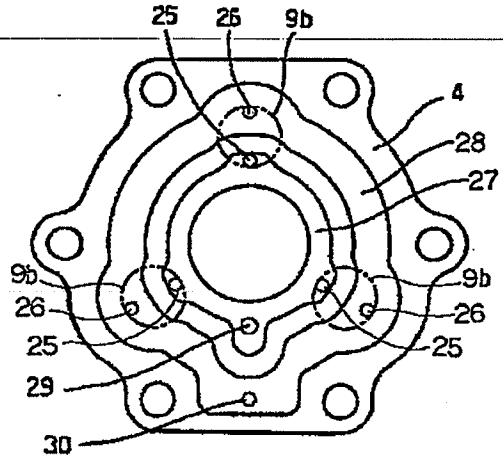
【図1】



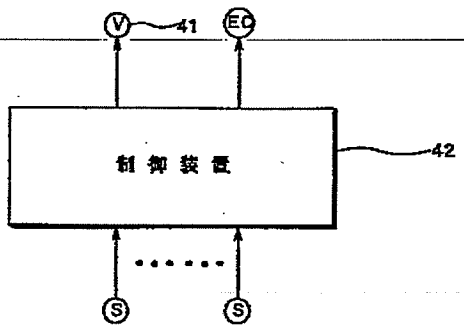
【図2】



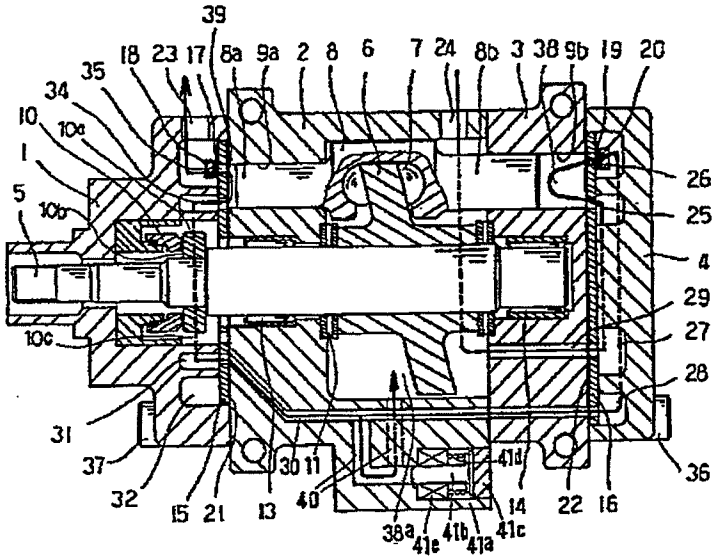
【図3】



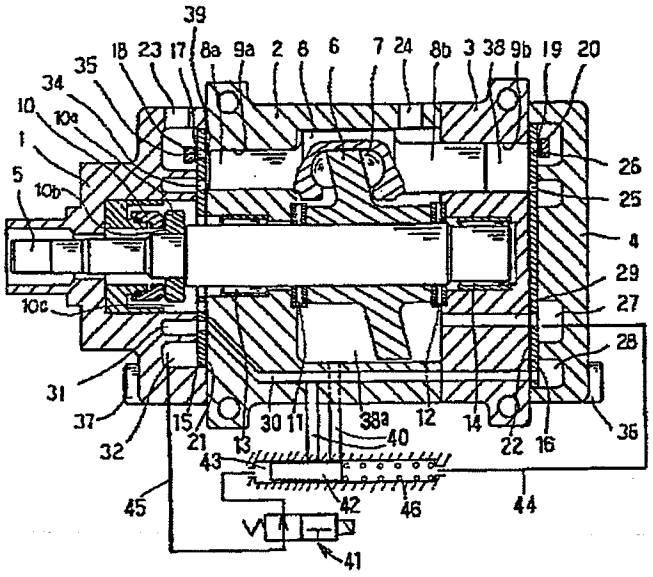
【図4】



【図5】


39
18 23 17 8a 9a 2 8 6 7 24 8b 3 38 9b 19 20
35
34
10
10a
1
5
10b
10c
31
37
32
15 21 13 30 11 40 38a 41e 41b 41a 41c 14 22 16 36
26
25
4
29
27
28

【図6】


39
18 23 17 8a 9a 2 8 6 7 24 8b 3 38 9b 19 20
35
34
10
10a
1
5
10b
10c
31
37
32
15 21 13 30 11 38a 40 12 14 22 16 36
43
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46
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41
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27
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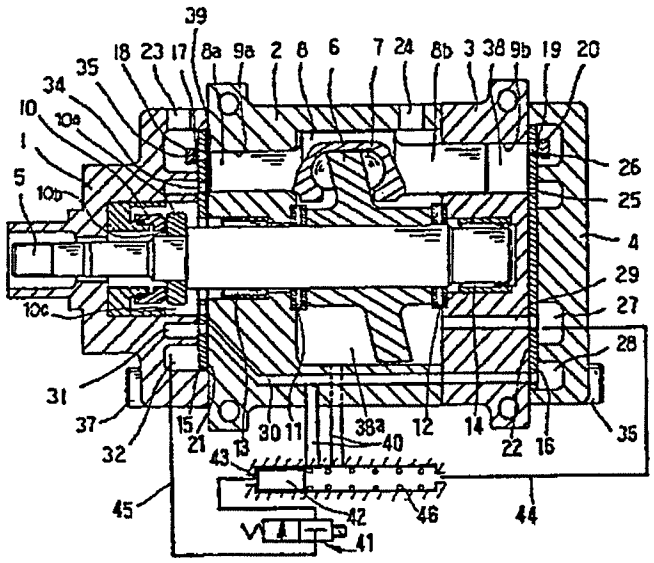
【図7】


39
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35
34
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10a
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29
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38a
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